

REMARKS

This paper is responsive to the Office Action dated August 26, 2009. Claims 30-59 are pending in the application. Presently, all claims 30-59 stand rejected. For the following reasons, reconsideration is respectfully requested.

Section 103(a) Rejections:

Claims 30, 32-40, and 54-59.

Claims 30, 32-40, and 54-59 were rejected under 35 U.S.C. § 103(a) as being obvious over O'REAR et al (WO 01/64610 A1).

The present invention is directed to a process for producing linear alkyl benzene and linear paraffins utilizing a hydrocarbon condensate containing olefins, paraffins and oxygenates from a low temperature Fischer-Tropsch reaction. The condensate "condensation product", as described at page 6 of the present application, contains olefins and paraffins in the C4 to C26 range, and oxygenates including alcohols, esters, aldehydes, ketones and acids. As explained at page 6 paragraph 3, olefins only make up approximately 10 to 30% by weight of this product. Generally, this product would not be considered useful in an alkylation reaction to form linear alkyl benzene, because of the need to remove oxygenates. The present inventors have, nevertheless and most surprisingly, found a way to use this condensate product in an alkylation reaction with benzene to produce linear alkyl benzene in an economically viable way. An advantage of the condensate product is that the olefins have a very high degree of linearity of greater than 95%, which leads to the production of highly linear alkyl benzene.

At point 5 of the Office Action, the Examiner asserts that O'REAR discloses a process for producing linear alkyl benzene, the process including the step of obtaining a hydrocarbon condensate containing olefins, paraffins and oxygenates from a low temperature Fischer-Tropsch (F-T) reaction and subsequently using this hydrocarbon condensate in a process as claimed herein for producing linear alkyl benzene. Applicants respectfully disagree. The phrases referred to by the Examiner do not disclose that the condensate contains olefins. Furthermore, O'REAR does not use

the hydrocarbon condensate in an alkylation reaction with benzene to produce linear alkyl benzene.

The C18-C26 fraction of F-T synthesis mentioned at page 2, line 13, and page 30, line 14 of O'REAR as being suitable for use in the production of linear alkyl benzene is further described at page 14, lines 7-15. The fraction described in O'REAR at page 14 lines 7-15 is erroneously referred to as a "condensate fraction". It is clear that this fraction, which contains catalyst fines (see page 14 line 9), is not a condensate. A condensate from a F-T reaction does not contain fines.

The F-T condensate fraction described in O'REAR at page 14 lines 1-5, which is said to include C5 to C20 normal paraffins and higher boiling hydrocarbons, is used in O'REAR to provide a C6-C8 fraction which is used to form aromatics. The condensate is not alkylated with benzene to form linear alkyl benzene. Furthermore, there is no mention in O'REAR that this fraction even contains olefins. It is clear that O'REAR did not consider the condensate fraction from a F-T reaction suitable for use in a process for producing linear alkyl benzene.

O'REAR does not describe or suggest the use of a condensate product as claimed in claim 30. There is therefore no reason for a person of ordinary skill in the art to modify O'REAR to produce the condensate product defined in the dependent claims of the present application.

In addition to the foregoing, O'REAR does not describe or suggest the linear alkyl benzene product with a degree of linearity of greater than 90% claimed in claim 58, or with a degree of linearity of greater than 94% claimed in claim 59.

It is noteworthy that the inventors have found that it is possible to take the hydrocarbon condensate of a Fischer-Tropsch reaction containing olefins and paraffins, remove oxygenates from the condensate, and provide a stream which is the product of a Fischer-Tropsch reaction, and which contains paraffins and sufficient olefins to be able to pass the stream through an alkylation reactor and obtain a linear alkyl benzene product as well as a linear paraffin product, without first having to dehydrogenate the feedstream.

O'REAR does state at page 2 lines 14-16 that the fractions are optionally but preferably treated, for example, by hydrotreating or extraction, to remove oxygenates and other by-products. In the detailed description at page 12 lines 3-4 of O'REAR, it is stated that the Fischer-Tropsch stream is preferably hydrotreated to remove any oxygenated products. However, at page 4 lines 19-20 of the detailed description of the invention and in Figure 1 of O'REAR, it is stated and shown that a C18-C26 fraction from a Fischer-Tropsch reaction is dehydrogenated to form C18-26 olefins, which are used to alkylate aromatics. Thereafter at page 30 lines 14-15 it is stated that the paraffinic C18-C26 fraction must be converted into olefins, for example, via dehydrogenation chemistry.

It is clear that, although O'REAR mentions extraction to remove oxygenates, the preferred method of oxygenate removal is hydrotreatment. Furthermore, irrespective of the type of oxygenate removal step, O'REAR et al teaches that the fraction must be dehydrogenated prior to the alkylation step. Once a hydrocarbon stream which is the product of a Fischer-Tropsch reaction undergoes a dehydrogenation reaction it is no longer a product of a Fischer-Tropsch reaction, but the stream is a product of a dehydrogenation reaction. Thus, O'REAR teaches the alkylation of a hydrocarbon stream which is the product of a dehydrogenation reaction, whereas in the present invention, as claimed in claim 30, the stream which undergoes the alkylation reaction in step c) is "a stream containing olefins and paraffins which is the product of a Fischer-Tropsch reaction". Accordingly, in the present invention, the condensate stream used in the alkylation step c) is the product of a Fischer-Tropsch reaction which has not undergone an expensive dehydrogenation step.

At page 2 lines 25-27 in the summary of the invention, it is stated in O'REAR that depending on the particular Fischer-Tropsch conditions, the C18-C26 fraction may include sufficient olefins and alcohols such that it can be directly reacted with aromatics to form alkylbenzenes. In this case, where O'REAR suggests the direct reaction of the C18-C26 fraction in an alkylation reaction without a dehydrogenation step, no oxygenate removal step is suggested. If an oxygenate removal step did take place, the fraction would not "include sufficient olefins and alcohols", because the alcohols would have

been removed. Accordingly, where a direct alkylation step is suggested in O'REAR, no oxygenate removal step is suggested. It is submitted that this reference actually teaches away from the present invention, because it would indicate to one of ordinary skill in the art that the O'REAR inventors did not believe that it would be possible to remove oxygenates from the stream and still have sufficient olefins for an alkylation reaction to form alkyl benzene.

Therefore, for at least the foregoing reasons, Applicants respectfully submit that claims 30, 32-40 and 54-59 are novel and inventive in view of O'REAR.

Claims 31 and 41-53:

Claims 31 and 41-53 were rejected under 35 U.S.C. § 103(a) as being unpatentable over O'REAR "as applied to claims 46, 48-57, and 71" (?) above, and in further view of BECKER (DE 1991910 A1) and DE WET et al (WO 02/31085 A2).

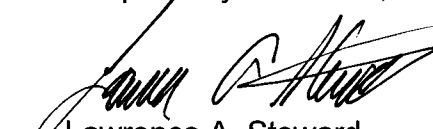
Each of claims 31 and 41-53 depends, directly or indirectly, from independent claim 30, and is believed allowable for at least the same reasons as claim 30. As regards the rejection that the claims 31 and 41-53 lack patentability over O'REAR in view of BECKER, and DE WET, Applicants submit that even if the hydrotreatment step (the preferred oxygenate removal step) of O'REAR were replaced with an extraction step described in BECKER or DE WET, claim 30 of the present invention would not be attained because a person skilled in the art would not be led by O'REAR to use the hydrocarbon condensate of the F-T reaction, and would be led by O'REAR to dehydrogenate the stream prior to the alkylation step.

From the above, it is evident that O'REAR does not describe or suggest the process for producing linear alkyl benzene from a hydrocarbon condensate from a low temperature Fischer-Tropsch reaction defined in the claims. We respectfully submit that the claims are novel and inventive in view of the cited combination of O'REAR, BECKER and DEWET.

Conclusion:

Based upon the foregoing, Applicants respectfully submit that the present claims are novel and nonobvious in view of the prior art cited by the Examiner. Accordingly, Applicants respectfully request the issuance of a Notice of Allowance. If the Examiner believes the prosecution of this application can be advanced by way of a telephone conversation, the Examiner is respectfully invited to telephone the undersigned attorney.

Respectfully submitted,



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